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COLLEGE/DEPARTMENT – MHS/MLS

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COURSE CODE – CHM 102

1. Classification of alcohols
2. Based on the number of hydrogen atoms attached to the carbon atom carrying the hydroxyl group – If the number of hydrogen atoms attached to the carbon atom carrying the hydroxyl group one, three or two, it is a primary alcohol [1°], if it is one hydrogen atom it is the secondary alcohol [2°] and if there’s no hydrogen atom attached to the carbon atom carrying the hydroxyl group it is a tertiary alcohol [3°]. E.g. Methanol [CH3OH] [1°], Butan -2- ol [CH3CHOHCH2CH3] [2°], 2-Methylpropan -2 - ol [(CH3)3C – OH] [3°].
3. Based on the number of hydroxyl functional group present in the alcohol – Monohydric alcohols have only one hydroxyl functional group present in the alcohol structure. Dihydric alcohols [glycols] have two hydroxyl functional groups present in the alcohol structure. Trihydric alcohols or triols [glycerol] have three hydroxyl functional groups present in the alcohol structure. Polyhydric alcohols have more than three hydroxyl functional groups. E.g. Butan -1- ol [CH3CH2CH2CH2OH] – Monohydric alcohol, Ethan -1,2- diol [HOCH2CH2OH] – Dihydric alcohol, Propane -1-2-3- triol [OHCH2CH(OH)CH2OH – Trihydric alcohol.
4. SOLUBITY – Lower alcohols with up to 3 carbon atoms in their molecule are soluble in water because they form hydrogen bond. Water solubility of alcohol decreases with increasing molecular mass.

 All monohydric alcohols are soluble in organic solvent. The solubility of simple alcohols and polyhydric alcohols is largely due to their ability to form hydrogen bonds with water molecules.

1. Starchy foodstuff like potatoes and cereals [rice and maize] are the main source of ethanol. The starch granules are fist extracted by crushing and pressure-cooking the material which is then treated with malt at 50 to 60°c for an hour. Malt is partially germinated barley which contains the enzyme diastase and the starch is converted by this enzyme into maltose.

 2[C6H10O5] n [s] + nH2O [l]  → nC12H22O11 [aq]

 Starch diastase maltose

 60°C

Yeast is then added at room temperature. Yeast contains two enzymes; maltase which converts the maltose to glucose and zymase which then decomposes the glucose into ethanol and carbon [IV] oxide.

 C12H22O11 [aq] + H2O [l] → 2C6H12O6 [aq]

Maltose maltase glucose

 15

C6H12O16 [aq]  → 2C2H5OH [aq] + 2CO2

 Glucose zymase ethanol carbon [IV]

 15°C oxide

1. CH3CH(CH3)HC=O + CH3CH2CH2CH2MgCl

 ↓

 CH2CH2CH2CH3

 |

 CH3CH (OH3) ꟷ CꟷO MgCl

 |

 H

 ↓ H+ OH-

CH3CH (CH3) CHCH2CH2CH2CH3 + Mg (OH) Cl

CH3CH (CH3) CH (OH) CH2CH2CH2CH3 + Mg (OH) Cl [2- Methylheptan -3- ol]

1. CH3CH (CH3) HC=O → CH3CH (CH3) CH2OH

 LiAlH4/ (C2H5)2O

1. CH3CH2CH2OH + H2SO4 → CH3CH2CH2OH2OSO3H

 ↓ H2O

 CH3CHCH2OSO3H

 |

 H

 ↓ H2SO4

CH3CHOHCH3  ← CH3CH=CH2

 Propan -2- ol H+ OH-  Propene